

CLAIMS

1. A liquid crystal display device comprising:

two polarizer films having absorption axes being crossed normal to each other;

a liquid crystal cell disposed between these two polarizer films, comprising a pair of substrate and a liquid crystal layer composed of liquid-crystalline molecules held therebetween, wherein liquid-crystalline molecules are oriented substantially normal to the substrates under non-operative state in the absence of applied external electric field;

at least one layer of a first optically-anisotropic layer having an optically positive refractive anisotropy, being formed of rod-like liquid-crystalline molecules and having R_e , defined below, falling within a range from 40 to 150 nm at visible light; and

at least one layer of a second optically-anisotropic layer having an optically negative refractive anisotropy, and having R_e , defined below, of 10 nm or less and R_{th} , defined below, falling within a range from 60 to 250 nm at visible light:

$$R_e = (n_x - n_y) \times d \quad (1)$$

$$R_{th} = \{ (n_x + n_y) / 2 - n_z \} \times d \quad (2)$$

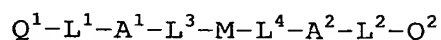
(where, n_x denotes refractive index in the slow-axis direction in a layer plane; n_y denotes in-plane refractive index in the direction normal to n_x ; n_z denotes refractive index in the thickness-wise direction of a layer; and d denotes thickness of a layer).

2. The liquid crystal display device of claim 1, wherein the first optically-anisotropic layer is a layer formed of

rod-like liquid-crystalline molecules having a polymerizable group.

3. The liquid crystal display device of claim 2, wherein the first optically-anisotropic layer is a layer formed of rod-like liquid-crystalline molecules each represented by a formula (I) below:

Formula (I)



where, each of Q^1 and Q^2 independently denotes a polymerizable group; each of L^1 , L^2 , L^3 and L^4 independently denotes a single bond or divalent linking group; each of A^1 and A^2 independently denotes a C_{2-20} spacer group; and M denotes a mesogen group.

4. The liquid crystal display device of any one of claims 1 to 3, wherein the first optically-anisotropic layer is a layer formed of rod-like liquid-crystalline molecules homogenously oriented in the direction substantially normal to the absorption axis of the polarizer film disposed closer to the first optically-anisotropic layer.

5. The liquid crystal display device of any one of claims 1 to 4, wherein the second optically-anisotropic layer is a layer formed of discotic liquid-crystalline molecules or polymer.

6. The liquid crystal display device of claim 5, wherein the second optically-anisotropic layer is a layer formed of discotic liquid-crystalline molecules having a polymerizable

group.

7. The liquid crystal display device of claim 5 or 6, wherein the second optically-anisotropic layer is a layer formed of a discotic liquid-crystalline molecules oriented substantially in a homeotropic manner.

8. The liquid crystal display device of any one of claims 1 to 5, wherein the second optically anisotropic layer is formed of cellulose acylate having acetyl and C₃₋₂₂ acyl replacing hydroxy and a degree of acetylation "A" and a degree of C₃₋₂₂ acylation "B" satisfy the formula (C) below

$$\text{Formula (C)} \quad 2.0 \leq A+B \leq 3.0.$$

9. The liquid crystal display device of claim 8 wherein the C₃₋₂₂ acyl is butanoyl or propionyl.

10. The liquid crystal display device of any one of claims 1 to 9, wherein the second optically-anisotropic layer also functions as a protective film for at least one of the two polarizer films.

11. The liquid crystal display device of any one of claims 1 to 10, wherein the first optically-anisotropic layer and the second optically-anisotropic layer are disposed while placing the liquid crystal cell between the first and the second layers.

12. The liquid crystal display device of any one of claims 1 to 11, wherein the absorption axis of the polarizer film

disposed closer to the first optically-anisotropic layer crosses substantially normal to the longitudinal direction of a transparent protective film of the polarizer film.

13. The liquid crystal display device of any one of claims 1 to 12, wherein at least one of the two polarizer films has a protective film formed of cellulose acetate which is disposed closer to the liquid crystal cell and has R_e of less than 3 nm.

14. A liquid crystal display device comprising:

two polarizer films having the absorption axes being crossed normal to each other;

a liquid crystal cell disposed between these two polarizer films, comprising a pair of substrate and a liquid crystal layer composed of liquid-crystalline molecules held therebetween, wherein liquid-crystalline molecules are oriented substantially normal to the substrates under non-operative state in the absence of applied external electric field;

at least one layer of a first optically-anisotropic layer formed of a stretched thermoplastic polymer film having an optically positive refractive anisotropy, and having R_e , defined below, falling within a range from 40 to 150 nm at visible light; and

at least one layer of a second optically-anisotropic layer having an optically negative refractive anisotropy, formed of discotic liquid-crystalline molecules, and having R_e , defined below, of 10 nm or less and R_{th} falling within a range from 60 to 250 nm at visible light:

$$R_e = (n_x - n_y) \times d \quad (1)$$

$$R_{th} = \{(n_x + n_y) / 2 - n_z\} \times d \quad (2)$$

(where, n_x denotes refractive index in the slow-axis direction in a layer plane; n_y denotes in-plane refractive index in the direction normal to n_x ; n_z denotes refractive index in the thickness-wise direction of the layer; and d denotes thickness of a layer).

15. The liquid crystal display device of claim 14, wherein the first optically-anisotropic layer is a stretched polycarbonate copolymer film.

16. A liquid crystal display device comprising:

two polarizer films having the absorption axes being crossed normal to each other;

a liquid crystal cell disposed between these two polarizer films, comprising a pair of substrate and a liquid crystal layer composed of liquid-crystalline molecules held therebetween, wherein liquid-crystalline molecules are oriented substantially normal to the substrates under non-operative state in the absence of applied external electric field;

at least one layer of a first optically-anisotropic layer formed of cellulose acylate having an optically positive refractive anisotropy, and having R_e , defined below, falling within a range from 40 to 150 nm at visible light, wherein the cellulose acylate has acetyl and C_{3-22} acyl replacing hydroxy and a degree of acetylation "A" and a degree of C_{3-22} acylation "B" satisfy the formula (C) below; and

at least one layer of a second optically-anisotropic layer having an optically negative refractive anisotropy, formed of

discotic liquid-crystalline molecules, and having R_e , defined below, of 10 nm or less and R_{th} falling within a range from 60 to 250 nm at visible light:

$$R_e = (n_x - n_y) \times d \quad (1)$$

$$R_{th} = \{(n_x + n_y)/2 - n_z\} \times d \quad (2)$$

(where, n_x denotes refractive index in the slow-axis direction in a layer plane; n_y denotes in-plane refractive index in the direction normal to n_x ; n_z denotes refractive index in the thickness-wise direction of the layer; and d denotes thickness of a layer);

$$\text{Formula (C)} \quad 2.0 \leq A+B \leq 3.0.$$

17. The liquid crystal display device of claim 16 wherein the C_{3-22} acyl is butanoyl or propionyl.

18. The liquid crystal display device of any one of claims 14 to 17, wherein the second optically-anisotropic layer is formed of discotic liquid-crystalline molecules having a polymerizable group.

19. The liquid crystal display device of any one of claims 14 to 18, wherein the discotic liquid-crystalline molecules of the second optically-anisotropic layer are oriented substantially in a homeotropic manner.

20. The liquid crystal display device of any one of claims 14 to 19, wherein the first optically-anisotropic layer also functions as a protective film for at least one of the two polarizer films.

21. The liquid crystal display device of any one of claims 14 to 20, wherein the absorption axis of the polarizer film closer to the first optically-anisotropic layer crosses substantially normal to the longitudinal direction of a transparent protective film of the polarizer film.

22. The liquid crystal display device of any one of claims 14 to 21, wherein at least one of the two polarizer films has a protective film formed of cellulose acetate which is disposed closer to the liquid crystal cell and has R_e of less than 3 nm.